INCH-POUND
AR/PD 12-01
with Change 8
02 DEC 2015

SUPERSEDING
AR/PD 12-01
with Change 7
01 SEP 2015

PURCHASE DESCRIPTION
IMPROVED RETENTION SYSTEM

Record of Revisions

REV	CHANGED BY	REVISED PAGE(S)	DESCRIPTION	DATE (D/M/Y)	Approval
-	PM SPE	Multiple	Update to GL-PD-07-19 to incorporate new design, materials and updated requirements for the Improved Retention System.	22/11/11	IAR
1	PM SPE	6, 9, 17 & 24	Corrected dimensional tolerances on thickness for Type VII webbing. Corrected NSN for ECH and ACH variants. Updated workmanship language in the specification.	21/09/12	IAR
2	PM SPE	7	Update to hardware requirement for anodized black/black oxide requirement.	13/03/13	IAR
3	PM SPE	5	Update to make the Tex Government reference only and clarify color standard.	22/05/13	AMW
4	PM SPE	22	Updated to incorporate DOT&E test protocol accept and reject rate for LAT	18/07/13	AMW
	PM SPE	Multiple	Nylon, webbing to be for Government reference only. Helmet Stability Test vertical load is applied at 1 inch/minute. Toxicity to have a CoC provided to meet requirements, Nylon webbing FAT sample size.	01/08/13	AMW
5	PM SPE	None	Administrative change issued to reflect correct change number.	14/11/13	AdeG
6	PM SPE	8, 9, 12, 15 & 18	Update to eliminate helmet stability testing. Update to ballistic hardware LAT testing quantities and hardware testing requirements. Corrected Identification and marking section to coincide with referenced drawings.	30/04/14	SBB

7	PM SPE	3, 4, 6, 7, 13, 16, 17	Added Left Handed IRS. Added requirement to trim thread ends to less than ¼ inch. Reworded dimensional defect descriptions for clarity	01/09/15	AWM
8	PM SPE	3, 4, 13	Corrected ACH/ECH nomenclature based on retention system hardware	02/12/15	AWM

MILITARY INTERESTS:

Custodians:
Army – PM SPE

Preparing activity:
Army – PM SPE

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST online database at https://assist.daps.dla.mil/quicksearch/.

Beneficial comments, suggestions, questions, or any pertinent data which may be used in improving this document should be addressed to: Product Manager – Soldier Protective Equipment, Program Executive Office – Soldier, US Army, 10170 Beach Road, Building 328T, Fort Belvoir, Virginia 22060.

AMSC N/A

FSC 8470

1. SCOPE

1.1 Scope. This document covers the requirements for the Improved Retention System which provides a means to attach the Advanced Combat Helmet and Enhanced Combat Helmet to the head, provides increased stability to the helmet, and provides a more secure and easier adjustment method. The Improved Retention System is a Critical Safety Item. This specification delineates the Improved Retention System end item performance requirements (see paragraph 6.1). The Improved Retention System is functionally integrated with the Advanced Combat Helmet (ACH) (AR/PD 10-02), Enhanced Combat Helmet (ECH) (GL-PD-09-04), and the Ballistic Nape Pad (AR/PD 10-01).

1.2 Classification. The Improved Retention System will be available in one type in the following classes and sizes specified.

1.2.1 Classes.

Class 1 – Advanced Combat Helmet (ACH) version
Class 2 – Enhanced Combat Helmet (ECH) version
Class 3 – Left Handed ACH version
Class 4 – Left Handed ECH version

Note: The only difference between the ACH and ECH Improved Retention Systems is the length of the associated retention system hardware.

1.2.2 Schedule of sizes.

Extra-Small (XS)
Small / Medium / Large / Extra-Large (S-XL)

Note: Size Extra-Small does not apply to the left handed version.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation or contract (see paragraph 6.2).

COMMERCIAL ITEM DESCRIPTIONS

A-A-55301	- Webbing, Textile, Textured or Multifilament Nylon
A-A-59826	- Thread, Nylon

Note: Exceptions/Additions to A-A-55301 for the purpose of this item can be found in Annex B.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-32075 - Label: For Clothing, Equipage and Tentage (General Use)

(Copies of purchase descriptions required by contractors in connection with specification procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

PURCHASE DESCRIPTIONS

AR/PD 10-02	- Helmet, Advanced Combat
GL/PD 09-04	- Helmet, Enhanced Combat
AR/PD 10-01	- Nape Pad

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

DRAWINGS
Ops-Core, Inc., Boston, MA 02210

Drawing no. 07-99-121	XS Size Retention System, ACH Variant
Drawing no. 07-99-101	S-XL Size Retention System, ACH Variant
Drawing no. 07-96-191	XS Size Retention System, ECH Variant
Drawing no. 07-96-101	S-XL Size Retention System, ECH Variant

PM SPE, Fort Belvoir, VA 22060

Drawing no. SPE-HP-15-216-A	S-XL Size Retention System, Left Handed, ACH Variant
Drawing no. SPE-HP-15-216-B	S-XL Size Retention System, Left Handed, ECH Variant

Note: The Government maintains limited use rights on these Ops-Core retention system drawings for procurements pertaining to the Ops-Core – NIB manufacturing agreements under the Ability One program as part of the Wagner-O'Day Act.

(Copies of drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense adopted are those cited in the issue of the DoDISS cited in the solicitation or contract. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see paragraph 6.2).

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Test Method 8	- Colorfastness to Crocking: AATCC Crockmeter Method
AATCC Test Method 15	- Colorfastness to Perspiration
AATCC Test Method 61	- Colorfastness to Laundering, Home and Commercial: Accelerated
AATCC Test Method 107	- Colorfastness to Water
AATCC Test Method 143	- Appearance of Apparel and Other Textile End Products after Repeated Home Laundering
AATCC Evaluation Procedure 1	- Gray Scale for Color Change
AATCC Evaluation Procedure 2	- Gray Scale for Staining
AATCC Evaluation Procedure 8	- AATCC 9-Step Chromatic Transference Scale
AATCC Evaluation Procedure 9	- Visual Assessment of Color Difference of Textiles

(Copies of these documents are available at www.aatcc.org or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASQ Z1.4	- Sampling Procedures and Tables for Inspection by Attributes

(Copies of documents are available at www.ansi.org or from the American National Standards Institute, 1819 L Street, 6th floor, Washington, DC.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL (ASTM)

ASTM-D-1777	- Standard Test Method for Thickness of Textile Materials
ASTM-E-4	- Practices for Force Verification of Testing Machines

(Applications for copies of referenced documents should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19426-2959 or online at www.astm.org.)

DEPARTMENT OF TRANSPORTATION (DOT) FEDERAL MOTOR VEHICLE SAFTEY

DOT FMVSS 218	- Department of Transportation Federal Motor Vehicle Safety Standard No. 218 Motorcycle Helmets

(Copies of documents are available on line at http://www.nhtsa.dot.gov/cars/rules/standards/safstan2.htm. The complete text of all Federal Motor Vehicle Safety Standards and other NHTSA regulations can be found in Title 49 of the Code of Federal Regulations (CFR). Title 49 of the CFR is published in seven volumes, the fifth volume (Parts 400-999) is where these regulations can be found. Copies of this volume can be obtained for a cost from the U. S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328.)

OTHER PUBLICATIONS

Repeat Insult Patch Test - Modified Draize Procedure

Principles & Methods of Toxicology (4th Edition), A Wallace Hayes (editor) p.1057-1060, 2001.

(Copies are available at http://www.taylorandfrancis.co.uk/ or from Taylor and Francis, 325 Chestnut Street, Philadelphia, PA 19106.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article testing (FAT) and lot acceptance testing (LAT). When specified in contract purchase order, complete Improved Retention Systems samples, representing full production quantity, shall be subjected to FAT in accordance with 4.2 or LAT in accordance with 4.3.

3.2 Materials and components. The materials and components shall conform to applicable specifications, standards, and drawings required herein unless otherwise noted in the contract or solicitation.

3.2.1 Thread. The thread used to fabricate all components of the retention system shall conform to the physical properties specified in A-A-59826: Nylon Thread, Type II, twisted multiple cord, Bonded Finish - Tex Size T-45, Class A. Tex Size shall be used for Government reference only. Color standard shall be Sand 34086.

3.2.2 Nylon, webbing. The webbing shall meet the requirements specified in A-A-55301 with the exceptions/additions denoted in Annex B when tested in accordance with ASTM-D-1777. The nylon webbing shall conform to the requirements in Annex A, Table I when tested in accordance with the test methods in Annex A, Table IV. Curvature shall be tested for Government reference only, and only one (1) specimen needs to be tested in accordance with A-A-55301.

3.2.3 Nape pad. The nape pad shall consist of an upholstered laminate that covers all sides of the internal foam. The outer layer shall consist of synthetic coated leather in a light tan color similar to Tan 499. The inner layer of foam shall be closed cell and have a density between 1 – 3 lb/ft^3. The inner layer of material that touches the head shall be a non-woven, natural or synthetic

leather in a light tan color that is similar to Tan 499. The three (3) layers shall be laminated and have a maximum thickness of 0.30 inches when tested in accordance with the methods in Annex A, Table IV.

3.2.4 Side release buckle set. The side release buckle set shall be Delrin/Acetal for the male component, Delrin/Acetal for the female component, and shall be Tan 499 in color. The buckle must require two separate input forces in different directions in order for it to release (like squeezing) so that it cannot be accidentally released if inadvertently pressed or pulled in a single direction. The buckle design should be such that the features that are used to release the buckle are shaped and protected in such a way as to not allow inadvertent release when bumping into other objects. The buckle must be shaped in such a way to allow convenient attachment and release of the retention system while wearing gloves for donning and doffing the helmet.

3.3 Design. The Improved Retention System shall consist of a 4-point retention system with a nape pad, tab assemblies and hardware (screws and screw posts). The Improved Retention System shall be two (2) sizes. The retention system and hardware shall be compatible with all sizes and manufacturers of the Advanced Combat Helmet (ACH) shell in accordance with AR/PD 10-02 and the Enhanced Combat Helmet (ECH) shell in accordance with GL/PD 09-04. The retention system shall use an open cup for the chin. The retention system shall use a side release buckle to secure the retention system to the user.

3.3.1 Finished measurements. Finished dimensions of the retention system shall conform to the following drawings: 07-99-121, 07-99-101, 07-96-191, 07-96-101, SPE-HP-15-216-A and SPE-HP-15-216-B .

3.4 Construction. Unless otherwise specified, the retention system shall be manufactured in accordance with the requirements in Annex A, Table II and Table III.

3.4.1 Workmanship. The finished retention system shall conform to the quality of product established by this specification. Quality of product is further described as the absence of defects as defined in 4.4.2 Visual Examination and Annex A, Table II End Item Visual Defects as well as those defined in 4.4.3 Dimensional Examination and Annex A, Table III End Item Dimensional Examination. This is applicable to all components whether finished by the prime contractor and by the prime's subcontractors. Utmost care shall be taken during fabrication to ensure quality workmanship and safety of the service person using the item. Deviations in acceptable manufacturing procedures and/or quality of materials being used shall immediately be reported to the contracting officer or his designee.

3.4.2 Thread Ends. Thread breaks or bobbin run-outs occurring during sewing shall be secured by stitching back of the break a minimum of 1/2 inch. Thread tension shall be maintained so that there will be no loose stitching resulting in loose bobbin or top thread, or excessively high stitching resulting in puckering of the materials sewn. Thread ends shall be trimmed to a length of not more than 1/4 inch.

3.5 Operating requirements.

3.5.1 Intended use. The improved retention system shall allow the user to easily don and doff the helmet and provide adjustment to allow for proper fit of the helmet in accordance with AR/PD 10-02 for ACH variants and GL/PD 09-04 for ECH variants.

3.5.1.1 Adjustment. The improved retention system must allow for quick and convenient adjustment of its size and level of tightness with one or both hands. When using one hand, the desired objective is that it takes less than two seconds per strap, and while using two hands, the desired objective is that it takes less than five seconds to properly adjust all four helmet straps. This capability must be inherent to all four webbing straps that ultimately attach to the four mounting points on the helmet shell and also be possible while wearing gloves.

3.5.2 Strength. The retention system must meet the following strength requirements when installed in an ACH or ECH and tested in accordance with AR/PD 10-02.

3.5.2.1 Static pull strength. No component of the retention system shall fail, the retention system closure device shall not release (open), and the webbings shall not slip when subjected to a load of 150 lb when tested in accordance with 4.4.5.

3.5.2.2 Dynamic pull strength. No component of the retention system shall fail when subjected to a 25 ft/sec drop when tested in accordance with paragraph 4.4.6.

3.5.3 Hardware. The hardware (screws and screw posts) shall be replaceable (i.e., not permanently part of the shell). The screws shall be anodized black or subjected to black oxide based on the material used (aluminum or steel respectively). Screw posts are not required to be anodized black or subjected to black oxide. The hardware shall interface with the webbing and firmly hold it in place when installed in any size ACH or ECH from any manufacturer. There shall be no exposed sharp edges on the hardware, either on the inside or outside of the shell.

a) For FAT, the hardware shall resist the impact of a 9mm 124-grain Full Metal Jacketed Round Nose (FMJ RN) projectile when tested and evaluated in accordance with AR/PD 10-02, unless otherwise specified in the contract.

b) For LAT, when required (see paragraph 6.2), the hardware shall resist the impact of a 9mm 124-grain FMJ RN projectile when tested in accordance with AR/PD 10-02 and evaluated based on Annex A, Table IV and Table VII, unless otherwise specified in the contract.

Testing will be conducted as specified in 4.4.7. Not meeting the requirements specified in 4.4.7 will result in FAT or LAT failure.

3.5.4 Visual shade matching. The color and appearance of all components of the retention system shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 (± 200) K illumination of 100 (± 20) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 (± 200) K.

3.5.5 Colorfastness. The material components specified above, shall conform to the minimum colorfastness requirements listed in Annex A, Table I when tested as specified in Annex A, Table IV.

3.5.6 Washability. The retention system shall be washable in accordance with AATCC Test Method 143. All other components shall be hand washable. No component shall show any signs of structural, visible or operational degradation or physical damage as a result of 10 washings (launderings). Testing shall be conducted in accordance with paragraph 4.4.8.

3.5.7 Toxicity. The retention system shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.4.9. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.6 Support or ownership requirements.

3.6.1 Identification and marking. The retention system shall be clearly marked with a sewn or heat sealed label conforming to Type VI, Class 4 of MIL-DTL-32075 indicating item nomenclature, contract number, national stock number (NSN), manufacturer's name, and lot number. However, the font type shall be Arial and text size for the contract number, NSN, manufacturer's name, lot number, size shall be between 6 point (approximately 1/16 inch) and 8 point (approximately 1/4 inch) in height. The color of the label shall be light tan or white and the lettering on the label shall be black in color. Refer to the current drawing for the location of the label. The retention system shall be permanently marked for identification regardless of use, maintenance or storage and shall be located or manufactured so as to prevent obliteration. Testing shall be conducted in accordance with paragraph 4.4.2.

3.6.2 Barcode/label. The retention system shall be individually bar-coded with a pressure sensitive label in accordance with Type VII, Class 17, of MIL-DTL-32075, when packaged in accordance with the contract or purchase order. The bar code element shall be the 13 digit national stock number (NSN). The bar codes for the NSNs should be medium to high density, clearly legible, and readable by a scanner (i.e., Motorola – Model #MC0909 or similar). The label shall be located so that it is completely visible on the item when it is folded and/or packaged as specified (see paragraph 5.1) and shall cause no damage to the item.

3.7 Responsibility for compliance. All items shall meet all requirements specified in sections 3 and 4 of this specification. The absence of any inspection requirements shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance shall conform to all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material. If there is a conflict between the stated requirements and the ANSI standard, the more restrictive requirement shall apply.

4. VERIFICATION

4.1 Classification of testing. The testing requirements specified herein are classified as follows:

a. First Article Testing (FAT) (see 4.2)
b. Lot Acceptance Testing (LAT) (see 4.3)

4.1.1 Certificate of conformance. When Certificates of Conformance (COC) are submitted, the Government reserves the right to inspect such items to determine the validity of the certification. Conformance shall be verified by test, inspection, demonstration, or analysis, on the end item assembly or lower level as appropriate. Supporting data will be available for Government review.

4.2 First article testing. A first article, submitted in accordance with 3.1, shall consist of examinations and tests as specified in 4.4.2-4.4.9, Annex A Table V, and AR/PD 10-02.

4.2.1 Material qualification. At any point after FAT has been approved, any desired material change must first be properly communicated to and authorized by the Government. It must be tested in accordance with the appropriate paragraphs of this Purchase Description as directed and approved by the Government.

4.2.2 Ballistic qualification. At any point after FAT has been approved, any desired material or process change to the hardware (screw or post) must first be properly communicated to and authorized by the Government. It will be required to pass all ballistic FAT requirements as specified in paragraph 4.4.8 and any other requirement potentially affected by the proposed change as directed and approved by the Government.

4.3 Lot acceptance testing. Lot acceptance testing shall be conducted on each lot of Retention Systems in production. A LAT shall consist of conformance inspection of the retention system end item, including ballistic QA verification testing. Random sampling for ballistic testing will be per Annex A, Table VI and Table VII. Random sampling for inspections per Annex A, Table II, Table III and Table IV (Requirement and Verifications Table) shall be performed in accordance with ANSI/ASQ Z1.4 Inspection Level I. For non-ballistic characteristics, Acceptable Quality Levels (AQL) are identified in the contract. Conformance inspection shall be considered met if the Retention Systems contained in the lot sample:

A) Pass Visual and Dimensional inspections including Workmanship: Retention Systems will be inspected and examined for conformance to the specifications and patterns, and demonstrate acceptable workmanship as defined in 4.4.1, 4.4.2, and 4.4.3.

B) Meet ballistic V_0 performance meeting requirements specified in 3.5.3 for the 9mm 124-grain FMJ RN projectile when tested in accordance with AR/PD 10-02 and evaluated against Annex A, Table VI and Table VII.

4.4 Requirements and verifications. Unless otherwise specified, all inspections shall be performed in accordance with all the requirements of referenced documents, unless otherwise amended, modified or qualified in this specification or applicable procurement documents (see paragraph 6.2).

4.4.1 In-process examination. Visual and dimensional examinations shall be made at any point or during any phase of the manufacturing process to determine whether construction details which cannot be examined in the finished product are in accordance with requirements specified in Section 3. Materials and components, classified as a defect in accordance with Annex A, Table IV, shall be removed from production.

4.4.2 Visual examination. The retention system shall be visually examined for compliance to all of the requirements of referenced documents unless otherwise specified. The retention system shall be examined for the defects listed in Annex A, Table II.

4.4.3 Dimensional examination. The completed retention system or individual components shall be examined for the defects listed in Annex A, Table III.

4.4.4 Component and end item testing. In accordance with 4.2 and 4.3, components and end items shall be tested for the characteristics listed in Annex A, Table IV. The methods of testing as specified wherever applicable and as listed in Annex A, Table IV shall be followed. The government reserves the right to inspect all components and end items to determine conformance to requirements.

4.4.5 Static pull strength test. The retention system pull test shall be tested with a testing machine that is in conformance with ASTM-E-4, "Practices for Force Verification of Testing Machines" or that specified in DOT FMVSS 218 (see paragraph 2.3). The helmet shall be rigidly attached to the testing machine base with either a clamp or headform device. The retention system shall be attached to a grip that simulates the jaw. The grip shall consist of freely-moving cylindrical rollers, each 0.25 inch radius, and rigidly spaced 3.0 inch apart (center-to-center) with a length of approximately 1.50-inch to accommodate the retention system chin-up (DOT FMVSS 218, Figure 4, for set-up).

The retention system pull test shall be tested as follows:

a) Mount the helmet in the test fixture. Use a suitable means to mark the retention system webbing ends at the attachment hardware points.

b) Apply a load at the rate of 1.0 (± 0.10) -inch/minute until a minimum 150-lb load is achieved. Hold the 150-lb for a minimum of 1 minute.

c) Inspect the retention system for failure as specified in 3.5.2.1 within 5 minutes of completing the 150 lb load for 1 minute. Use the marks on the webbing (see step a) to determine slippage. It should be noted that the retention system is allowed to stretch, but not slip (loosen). Failure to meet the requirements of 3.5.2.1 shall constitute test failure.

d) For information purposes only, continue applying a load to the retention system at a rate of 1.0 inch/minute until the retention system fails. Record the peak load as the pull strength and identify / record the mode of failure.

4.4.6 Dynamic pull strength test. Mount the finished helmet on the apparatus in accordance with 4.9.14 of Product Manager Soldier Protective Equipment, Purchase Description, Advanced

Combat Helmet, AR/PD 10-02. The helmet shall be dropped at 25 ft/sec onto a hemispherical anvil once on each of the locations in accordance with 4.9.13 of Product Manager Soldier Protective Equipment, Purchase Description, Advanced Combat Helmet, AR/PD 10-02. Separate helmets, pads, and retention systems may be used for each impact. The helmet shall then be inspected. Failure to meet the requirements of paragraph 3.5.2.2 shall constitute failure of the test.

4.4.7 Ballistic hardware testing. The retention system hardware will undergo ballistic testing against a 9mm 124-grain Full Metal Jacketed (FMJ) Round Nose (RN) projectile in accordance with Product Manager Soldier Protective Equipment, Purchase Description, Advanced Combat Helmet, AR/PD 10-02, unless otherwise specified in the contract.

4.4.7.1 Ballistic hardware FAT. FAT testing on the retention system hardware will be conducted in accordance with AR/PD 10-02 (specifically sections 3.9.2, 4.9.11, and Annex A). Failure to meet the requirements of paragraph 3.5.3 shall constitute failure of the test.

4.4.7.2 Ballistic hardware LAT. LAT testing on the retention system shall be conducted in accordance with AR/PD 10-02 (specifically sections 3.9.2 and 4.9.11), however, the quantities submitted for LAT and its accept/reject criteria shall be in accordance with Annex A, Table VI and Table VII. Failure to meet the requirements in 3.5.3 shall result in LAT failure. When applicable, hardware may be used from a previously accepted hardware lot with the provision of historical data. Certificates of Conformance (CoC) are acceptable. Upon CoC acceptance, additional ballistic hardware testing may not be required.

4.4.8 Washability. The retention system (except screws and posts) shall be subjected to 10 washings (launderings) in accordance with AATCC Test Method 143. The retention system shall be allowed to air dry between washings (launderings) and shall be visibly inspected for the requirements of 3.5.6. Any non-conformance with the requirements of 3.5.6 shall constitute a failure.

4.4.9 Toxicity test. When required (see paragraph 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the neckerchief is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see paragraph 2.3). Toxicity requirements can be demonstrated with historical use data. Certificates of Conformance (CoC) are acceptable.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see paragraph 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

6.1 Intended use. The retention system is intended for use in the Advanced Combat Helmet (ACH) and Enhanced Combat Helmet (ECH) by ground troops and parachutists to provide helmet retention and stability.

6.2 Acquisition requirements. Acquisition documents must specify the following:

1. Title, number and date of this specification.
2. Issue of DoDISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see paragraphs 2.2 and 2.3).
3. When first article testing is required, (see paragraph 3.1), the item will be tested and should be a first article sample (pre-production sample). The first article shall be inspected and approved under the appropriate provisions of FAR 52.209-4. The contracting officer should include specific instructions in acquisition documents regarding arrangements for quantity, selection, inspection, examination, testing and approval of the first article.
4. Toxicity requirements (see paragraphs 3.5.7 and 4.4.9).
5. Acceptance criteria shall be as specified in the contract or purchase order.
6. Packaging requirements (see paragraph 5.1).

6.3 Standard samples. For access to standard samples, contact the procuring activity issuing the invitation for bid.

6.4 National stock numbers (NSN) and Material Control Numbers (MCN).

Advanced Combat Helmet (ACH) Version		
NSN	**Size**	**Description**
8470-01-599-3851	S / M / L / XL	H-Nape Improved Retention System
8470-01-599-3839	XS	H-Nape Improved Retention System
8470-01-599-3846	-	Improved Retention System Hardware

Enhanced Combat Helmet (ECH) Version		
NSN	**Size**	**Description**
8470-01-599-3210	S / M / L / XL	H-Nape Improved Retention System
8470-01-599-3960	XS	H-Nape Improved Retention System
8470-01-599-3949	-	Improved Retention System Hardware

Left Handed ACH Version		
NSN	**Size**	**Description**
8470-01-644-2149	S / M / L / XL	Left Handed H-Nape Improved Retention System
8470-01-599-3846	-	Improved Retention System Hardware

Left Handed ECH Version		
MCN	**Size**	**Description**

8470-01-F05-1248	S / M / L / XL	Left Handed H-Nape Improved Retention System
8470-01-599-3949	-	Improved Retention System Hardware

Note 1: The size column indicates the size of the Improved Retention System, not the size of the applicable helmet.
Note 2: The Left Handed ECH H-Nape Improved Retention System uses an MCN rather than an NSN.

6.5 Subject term (key word) listing.

Retention System
Chinstrap
Webbing

ANNEX A: REQUIREMENTS AND VERIFICATIONS

Table I – Colorfastness requirements

Color evaluation	Laundering(1 cycles) 1/ (min.)	Water 1/ (min.)	Perspiration (acid & alkaline) 1/ (min.)	Crocking 2/ (min)
Tan 499	3 or better	3 or better	3 or better	3 or better

1/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change and AATCC Evaluation Procedure 2, Gray Scale for Staining.

2/ Rated using the AATCC Evaluation Procedure 8, AATCC 9-Step Chromatic Transference Scale.

Table II - End item visual defects

Examine	Defect	Classification	
		Major	Minor
Retention system	Any component incorrectly installed on helmet (e.g., wrong side or backwards). 2/	101	
	Any required component omitted.	102	
	Any sharp edge or burr. 1/	103	
	Any hardware not secured in the orientation specified. 2/	104	
	Any hardware component not finished as specified. 2/	105	
	Any hole, cut, tear, or smash in webbing. 3/	106	
	Webbing not firmly or tightly woven, edges frayed or scalloped.	107	
	Webbing possessing multiple floats.	108	
	Webbing possessing abrasion mark, broken or missing yarns, slub, or broken end or pick.	109	
	Any hole, cut, tear, or smash in materials other than webbing. 3/	110	
	Any mend, yarn, or patch.	111	
	Any raw edge (any edge not securely caught in stitching or treated as to prevent fray – such as hot knife treatment)		201
	Any webbing joint not securely stitched		202
	Thread ends longer than ¼ inch	112	
	Stitch tension loose, resulting in loose bobbin or top thread.		203
	Stitch tension excessively tight, resulting in puckering material.		204
	Stitching ends not secured.		205
	Thread breaks, skipped stitches, or run-offs not overstitched.	113	
	Bartack or box-x, if any, omitted.	114	
	Bartack or box-x, if any, not as specified or not in specified location.	115	

Examine	Defect	Classification	
		Major	Minor
Marking	Retention System: omitted, incorrect, illegible, or not as specified.	116	
Barcode	Omitted or not readable by scanner. Human readable interpretation (HRI) omitted. Not visible on packaged item. Causes damage to the end item.	 117	206 207 208
Stitch margin or gage	Not within specified tolerance.		209
Box, box-x and stitching	Dimensions not within specified tolerance.		210

1/ A sharp edge shall be defined as something likely to cut skin if contacted.

2/ Test shall be conducted when hardware and/or helmets are available for acceptance testing.

3/ Small tooling / manufacturing aid holes are permitted. Samples shall be provided prior to First Article Testing for Government review and acceptance.

Table III - End item dimensional examination

Examine	Defect	Classification	
		Major	Minor
Dimensions	Dimension between the nominal dimension minus the applicable lower tolerance and the nominal dimension minus twice the applicable lower tolerance Dimension smaller than the nominal dimension minus twice the applicable lower tolerance Dimension larger than the nominal dimension plus the applicable upper tolerance	 118 119	211

Table IV - Component / End Item Tests

Characteristic	Required Paragraph	Test Method
Laminated foam	3.2.3	ASTM D-1777 Testing Option 1
Static pull strength test	3.5.2.1	See 4.4.5
Dynamic pull strength test	3.5.2.2	See 4.4.6
Hardware test	3.5.3	See 4.4.7
Visual shade matching	3.5.4	AATCC Evaluation Procedure 9, Option A
Colorfastness:		
Laundering, after 1 cycle	3.5.5	AATCC 61 Test 2A 1/
Crocking	3.5.5	AATCC 8
Perspiration (acid & Alkaline)	3.5.5	AATCC 15
Water	3.5.5	AATCC 107
Washability	3.5.6	See 4.4.8

Toxicity	3.5.7	See 4.4.9

1/ Multiple samples are to be used and shall be arranged side-by-side to cover test fabric.

Table V - Requirements and Verifications Table

Characteristic	**Requirement / Verification Paragraph**	**First Article Testing 1/**	**Lot Acceptance Testing 1/**	**FAT Sample Size**
Retention Systems	3.3, 3.3.1 and Per the drawings referenced in 3.3.1	X	2/	4 Retention Systems per Workshop 4/
Thread	3.2.1	X	2/	1 spool (cone) 3/
Nylon Webbing	3.2.2, Table I and Table IV	X	2/	60 feet 3/
Laminated Foam	3.2.3	X	2/	5 samples
Side Release Buckle Set	3.2.3	X	2/	5 each male and female
Static Pull Strength	3.5.2.1 and 4.4.5	X	2/	1 Retention System attached to 1 Medium ACH
Dynamic Strength	3.5.2.2 and 4.4.6	X	2/	7 Retention Systems attached to 7 Medium ACH/ECH
Visual Shade Matching	3.5.4	X	2/	3/
Colorfastness	3.5.5, Table I and Table IV	X	2/	3/
Washability	3.5.6 and 4.4.8	X	2/	3/
Toxicity	3.5.7 and 4.4.9	X	2/	As per 4.4.9 CoC
Identification and Marking	3.6.1 and 4.4.2	X	X (DCMA QAR)	4/
Barcode / Label	3.6.2	X	X (DCMA QAR)	4/
Workmanship	3.4, 3.4.1, Table II and Table III	X	X (DCMA QAR)	4/

1/ An "X" in the column designates that the test is performed. Sampling rate for conformance lot testing is per ANSI/ASQ Z1.4, Inspection Level I, unless otherwise specified in the contract and / or the above Table.

2/ Certification of Conformance (COC) provided for Lot Conformance shall certify that the design and materials have not changed since approval of FAT and shall be complete with test data / results. Conformance shall be verified by test, inspection, demonstration, or analysis on the end item assembly or lower level as appropriate. Supporting data shall be available for Government review. The Government reserves the right to inspect or test such items to verify the validity of the certification.

3/ The stated quantity provides enough material to cover all of the required tests.

4/ Four (4) Retention systems will cover all of the required tests.

Table VI - Ballistic Hardware Testing for Lot Acceptance

Hardware Lot Size	LAT – Ballistic Hardware Testing	
	9mm RTP (Hardware) Shots	Helmets Required (including contingencies)
1,201 – 35,000	8	6
> 35,000	13	10

Note: RTP testing on hardware will consist of two (2) shots per helmet on a front and rear bolt for the ACH and two (2) shots per helmet on both rear bolts for the ECH. Testing will be conducted in Ambient conditions only.

These quantities are derived, per Lot Size, per ANSI/ASQ Z1.4 4.0, Special Inspection Level S-2.

Normal Inspection
Switching Rules do not apply
No additional testing

Table VII - Accept/Reject Criteria for Ballistic Hardware Lot Acceptance

Hardware Lot Size	LAT – Accept/Reject Criteria	
	9mm RTP (Hardware)	
	Accept	Reject
> 1,201	1	2

9mm RTP (Hardware) – One (1) complete penetration is equivalent to one (1) minor defect.

Failure of the ballistic LAT portion shall prompt a metallurgical evaluation of the bar stock and finished hardware for the failed lot.

Material Certificates of Compliance shall be submitted for the hardware, including the raw material and the surface treatment.

The Government reserves the right to perform additional material testing at any time.

ANNEX B: EXCEPTIONS / ADDITIONS TO A-A-55301

Below are the changes to the Commercial Item Description: Webbing, Textile, Textured or Multifilament Nylon (A-A-55301) dated 15 Nov 1996 for the purposes of this item.

Paragraph 2
After "Type VI 1 1/2 inch" insert "Type VII 5/8 inch Retention System"

Paragraph 3.1.1
Line 2: after "Air Jet texturing is acceptable" insert "except for Type VII"

Paragraph 3.2.3
Line 1: after "Camouflage green 483," insert "Tan 499 for Type VII".

After "Spectral Reflectance Requirements for Camouflage Green 483" insert:

Spectral Reflectance Requirements for Tan 499

Wavelength (mm)	**Reflectance (%)**		**Wavelength (mm)**	**Reflectance (%)**	
	Min	**Max**		**Min**	**Max**
600	8	26	740	22	50
620	8	26	760	30	50
640	8	30	780	34	54
660	8	34	800	36	56
680	12	38	820	38	58
700	12	40	840	38	58
720	16	46	860	40	60

Paragraph 3.3
Table I: insert "Type VII":

Characteristics	**Type VII**
Width, inches	5/8" + 1/16"
Thickness, inches 2/	0.038" ± 0.005"
Weight oz./lin. yd (Min) 3/	0.28
Stiffness load pounds widthwise only 4/	---
Warp ends, full width: Face, Back, and Middle Warps (min) Face and Back (min) Binder Warp (min) Stuffer Warp (min)	 --- 100 23 ---
Picks / inch (min) Picks / inch (min) (shuttleless loom)	28 ---
Breaking strength lbs (min) 5/	400

Paragraph 3.4.8
After "Paragraph 3.4.8" insert "3.4.9 Type VII. The Retention System webbing shall be a tubular weave bound together by a plain weave binder. See Fig. 10."

Paragraph 3.6
Line 1: after "bar-coded" insert "except for Type VII"

Figure 9
After "Figure 9" insert:

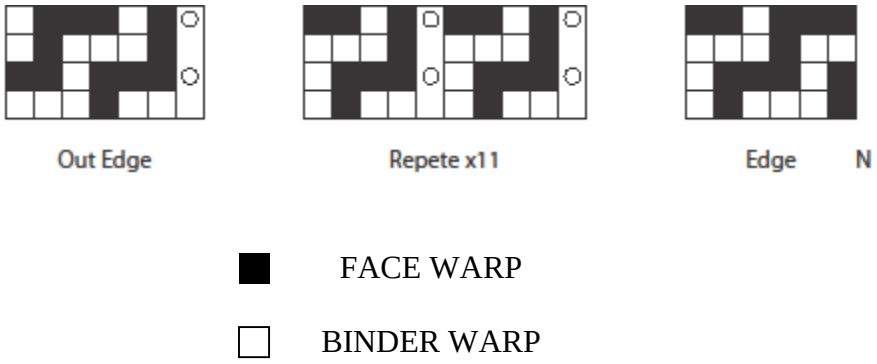

Figure 10. Weave Diagram for Type VII – 5/8 Inch Retention System